20. Case18：Color-controlled TPBot
20.1. Purpose

- The rainbow LED changes in accordance with the color of the cards and it executes the defined functions accordingly(move forward,;change the color of the headlights at random; obstacles avoidance; line-following)

20.2. Material

1 x TPBot

20.3. Hardware connection

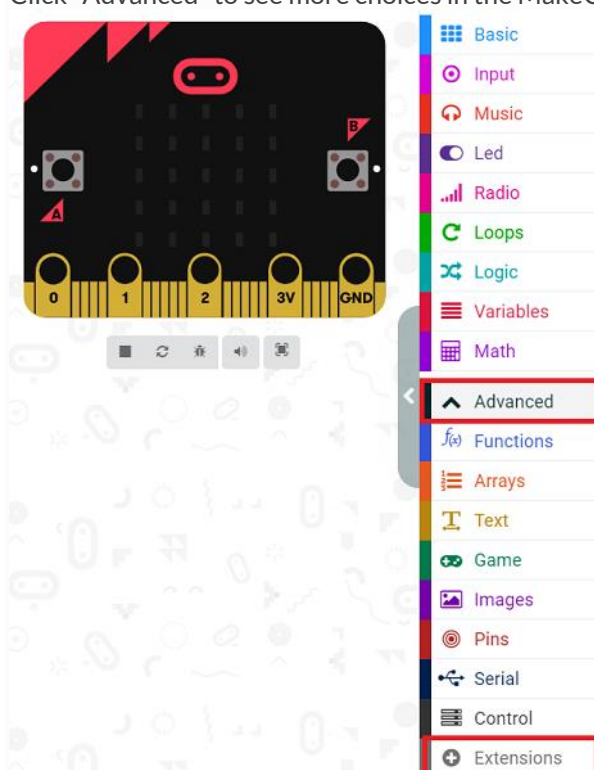Connect rainbow led to port 1 and color sensor to IIC port on TPBot.

20.4. Software

MicroSoftmakecode
20.5. Programming

Click "Advanced" to see more choices in the MakeCode drawer.

- We need to add a package for programming. Click "Extensions" in the bottom of the drawer and search with "tpbot" in the dialogue box to download it.
- We need to add a package for programming. Click "Extensions" in the bottom of the drawer and search with "PlanetX" in the dialogue box to download it.
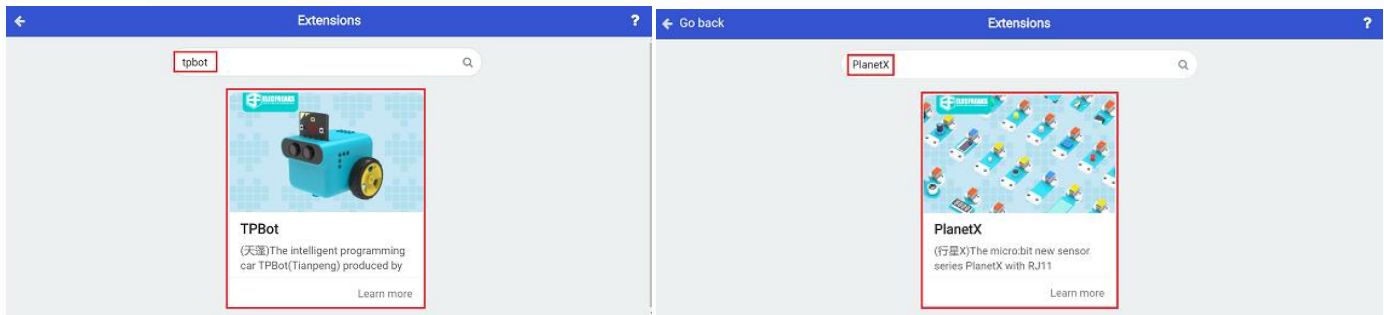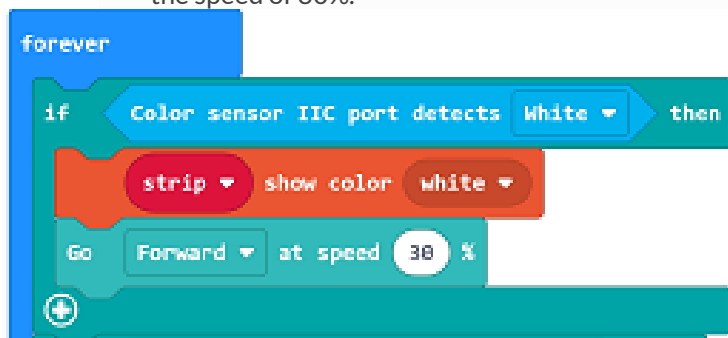

20.6. Sample

- In on start brick, drag the show icon brick into it and initialize the led strip and has it connected to J1 port.
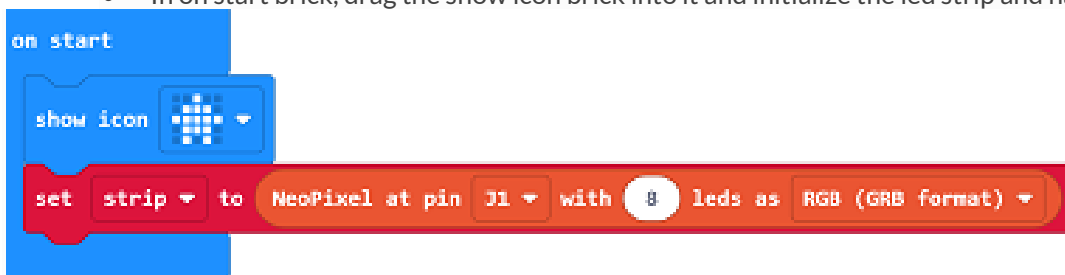
- In forever brick, set the rainbow led in white if the color sensor detects white, and set TPBot move forward at the speed of 30%.

- Set the rainbow led in red if the color sensor detects red, set TPBot stop moving and the RGB value of the headlight a random number among 0~225.
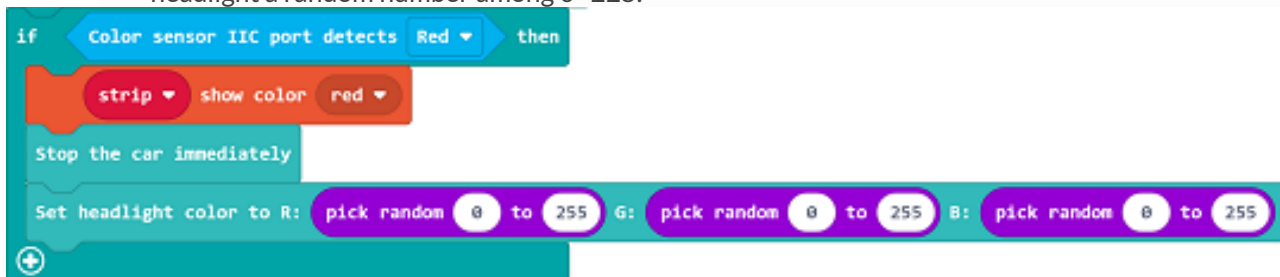
- Set the rainbow led in yellow if the color sensor detects yellow, and judge if the returned value from the sonar:bit is between 3~20. If yes, set TPBot turn left for 1s at the speed of 30% or move forward at the speed of 30%.

```
if      Color sensor IIC port detects  Yellow ▾      then
            strip ▾   show color  yellow ▾
    if      Sonar distance  > ▾   3  cm    and ▾   Sonar distance  < ▾   20  cm    then
        Go    Left ▾   at speed  30  % for  1  seconds
    else                                                                            ⊖
        Go    Forward ▾  at speed  30  %
    ⊕
```

- Set the rainbow led in green if the color sensor detects green, and judge the status of the two-way line-tracking sensor. If black is detected on the left, set the speed of the left wheel as 0 and right as 40; if it is detected on the right, set the speed of the left wheel as 40 and right as 0; if it is detected on both sides, it means the TPBot does not deviate from the black line, and set it move foreward at the speed of 25%.

```
if      Color sensor IIC port detects  Green ▾      then
            strip ▾   show color  green ▾
    if      Line sensor state is  ○ ● ▾     then
        Set left wheel speed at  40  % right wheel speed at  0  %
    else if   Line sensor state is  ● ○ ▾    then  ⊖
        Set left wheel speed at  0  % right wheel speed at  40  %
    else                                                          ⊖
        Set left wheel speed at  25  % right wheel speed at  25  %
    ⊕
```

- Set the rainbow led in blue if the color sensor detectsblue, set the TPBot stop moving.

```
if      Color sensor IIC port detects  Blue ▾      then
            strip ▾   show color  black ▾
    Stop the car immediately
    ⊕
```

Code：

```blocks
on start
    show icon [icon]
    set strip ▼ to NeoPixel at pin J1 ▼ with 8 leds as RGB (GRB format) ▼

forever
    if < Color sensor IIC port detects White ▼ > then
        strip ▼ show color white ▼
        Go Forward ▼ at speed 30 %
    ⊕
    if < Color sensor IIC port detects Red ▼ > then
        strip ▼ show color red ▼
        Stop the car immediately
        Set headlight color to R: (pick random 0 to 255) G: (pick random 0 to 255) B: (pick random 0 to 255)
    ⊕
    if < Color sensor IIC port detects Yellow ▼ > then
        strip ▼ show color yellow ▼
        if < Sonar distance > ▼ 3 cm and ▼ Sonar distance < ▼ 20 cm > then
            Go Left ▼ at speed 30 % for 1 seconds
        else
            Go Forward ▼ at speed 30 %
        ⊕
    ⊕
    if < Color sensor IIC port detects Green ▼ > then
        strip ▼ show color green ▼
        if < Line sensor state is o ● ▼ > then
            Set left wheel speed at 40 % right wheel speed at 0 %
        else if < Line sensor state is ● o ▼ > then
            Set left wheel speed at 0 % right wheel speed at 40 %
        else
            Set left wheel speed at 25 % right wheel speed at 25 %
        ⊕
    ⊕
    if < Color sensor IIC port detects Blue ▼ > then
        strip ▼ show color black ▼
        Stop the car immediately
    ⊕
```

Link

- Link：https://makecode.microbit.org/_YrH0rDiLJEKg
- You may also download it directly below:

-- --- ## Conclusion ---

- Place the cards in different color in the front of the gesture sensor to activate different functions:
- White card: Rainbow LED lights on in white and TPBot moves forward.
- Red card: Rainbow LED lights on in red and TPBot stops moving with the headlights changing the colors at random.
- Yellow card: Rainbow LED lights on in yellow and TPBot goes into the obstacle-avoidance mode.
- Green card: Rainbow LED lights on in green and TPBot goes into the line-tracking mode.
- Blue card: Rainbow LED lights on in blue and TPBot stops moving.

20.7. Exploration

20.8. FAQ

Q: While operating this case, why the car might not work properly?

A: It might be the low power of the batteries, please try adding the value of TPBot's speed and test again.